**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE:\_\_\_\_\_\_\_\_\_\_ PER. \_\_\_\_\_**

**THE LESSON OF THE KAIBAB**

**Background**

The environment may be altered by forces within the biotic community, as well as by relationships between organisms and the physical environment. The carrying capacity of an ecosystem is the maximum number of organisms that an ecosystem can support. The density of a population may produce such huge changes in the environment that the environment becomes unsuitable for survival of a species. Humans can and have interfered with these natural interactions and have had mainly negative effects, though some human intervention has produced positive effects.

Before 1905, the deer on the Kaibab Plateau in Arizona were estimated to number about 4000 on almost 300,000 hectares (1 hectare = 100 acres) of range. The average carrying capacity of the range was estimated them to be about 30,000 deer. On November 28, 2906, President Theodore Roosevelt created the Grand Canyon National Game Preserve to protect the “finest deer herd in America.”

Unfortunately, by this time the Kaibab forest area had already been overgrazed by sheep, cattle, and horses. Most of the tall perennial (plants that come back year after year) had been eliminated. The first step to protect the deer was to ban all hunting. In addition, in 1907, the Forest Service tried to exterminate the predators of the deer. Between 1907 and 1939, 816 mountain lions, 20 wolves, 7388 coyotes, and more than 500 bobcats, all of which were predators of the deer, were killed.

Signs that the deer population was out of control began to appear as early as 1920 – the range was beginning to deteriorate rapidly. The Forest Service reduced the number of livestock grazing permits. By 1923, the deer were reported to be on the verge of starvation and the range conditions were described as “deplorable.”

A Kaibab Deer Investigating Committee recommended that all livestock not owned by local residents be removed immediately from the range and that the number of deer be cut in half as quickly as possible. Hunting was reopened, and during the fall of 1924, 675 deer were killed by hunters. However, these deer represented only 1/10 the number that had been born that spring.

Today, the Arizona Game Commission carefully manages the Kaibab area with regulations geared to specific local needs. Hunting permits are issued to keep the deer in balance with their range. Predators are protected to help keep herds in balance with food supplies Tragic winter losses can be checked by keeping the number of deer near the carrying capacity of the range.

**MATERIALS**

3 different colored pencils

**PROCEDURE**

1. Using one of the colored pencils and the graph in the **“Results”** section, draw and label a horizontal line representing the carrying capacity of the range.

2. Using another colored pencil, graph the data in **Table 1: Deer Population from 1905 to 1924**.

3. Using the 3rd colored pencil, graph the data in **Table 2: Deer Population from 1925 to 1939**.

4. Remember to create a key for your graph and Make a title for your graph.

**SEE THE “MAKING TITLES FOR TABLES AND GRAPHS” WHICH WE HANDED OUT TO YOU.**

5. Answer the questions contained in “**Conclusion**” section.

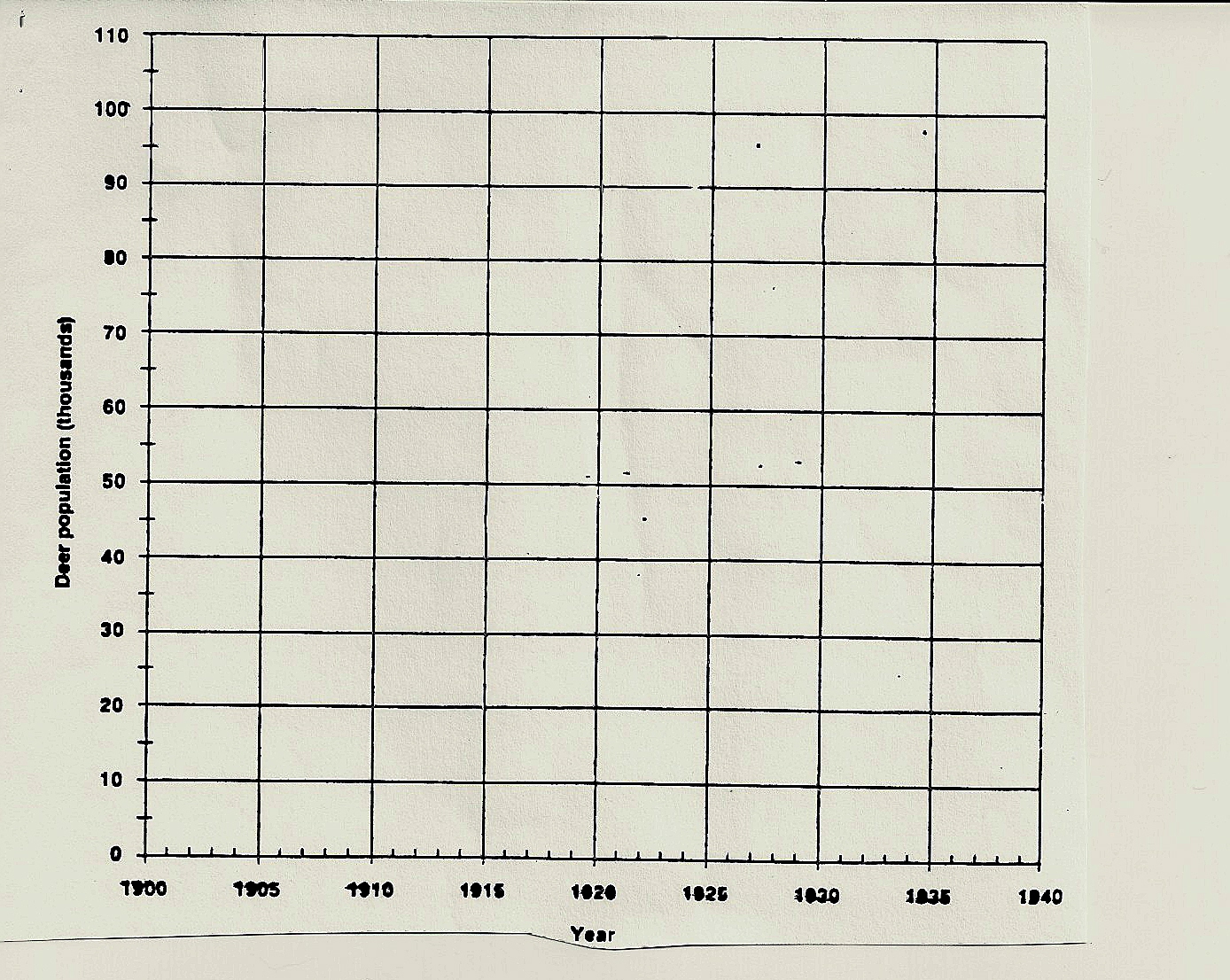
**RESULTS**

|  |  |
| --- | --- |
| **YEAR** | **DEER POPULATION** |
| 1905 | 4,000 |
| 1910 | 9,000 |
| 1915 | 25,000 |
| 1920 | 65,000 |
| 1924 | 100,000 |

**TABLE 1: Deer Population of the Kaibab from 1905 – 1924**

|  |  |
| --- | --- |
| **YEAR** | **DEER POPULATION** |
| 1925 | 60,000 |
| 1926 | 40,000 |
| 1927 | 37,000 |
| 1928 | 35,000 |
| 1929 | 30,000 |
| 1930 | 25,000 |
| 1931 | 20,000 |
| 1935 | 18,000 |
| 1939 | 10,000 |

**TABLE 2: Deer Population of the Kaibab from 1925 – 1939**

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**FIG 1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**CONCLUSION**

1. In 1906 & 1907 what two methods did the Forest Service decide to use to protect the Kaibab

deer? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. How many total predators were removed from the preserve between 1907 & 1939?

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3. What was the relationship between the deer population and the carrying capacity of the range in:

1915? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1920? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1924? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Did the Forest Service program appear to be successful between 1905 & 1924? Use the data

in the graph to explain your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. Why do you suppose the population of the deer declined in 1925 although the predators were

being removed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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6. Do you think any changes had occurred in the carrying capacity of the range from 1900 to

1940? Why or Why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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7. Why do you suppose the population of deer in 1900 was 4,000 when the range had an

estimated carrying capacity of 30,000 deer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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8. Without the well-meaning interference of humans, what do you think would have happened to

the deer population after 1900? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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9. What major lessons were learned from the Kaibab deer experience? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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